MARINE REVIEW.

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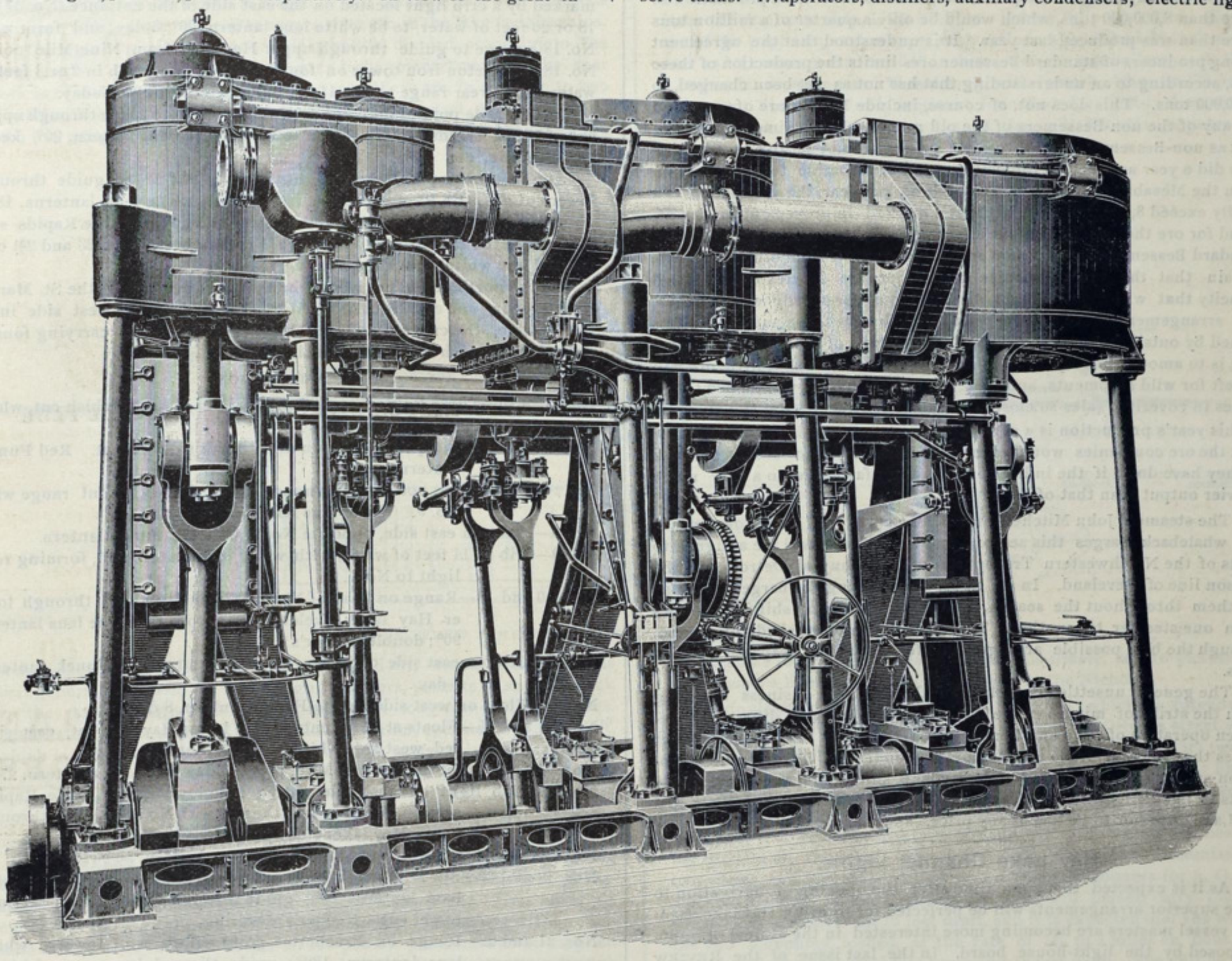
Engines of One of England's Greatest New Battleships.

One of the twin sets of triple expansion engines to be fitted in the new British battleship Magnificent, which belongs to the largest class of war vessels yet constructed, is illustrated on this page. It is expected that the Magnificent will be ready for trial in a few months. Her displacement is 14,900 tons, of which 10,180 tons is due to the weight of the hull. The length is 390 feet, the beam 75 feet, and the mean load draft 27 feet 6 inches.

This machinery, which was built by John Penn & Sons, Greenwich, is to develop 12,000 indicated horse power with induced draught and 10,000 indicated horse power with natural draught, the speeds at these powers being 17½ and 16½ knots respectively. In view of the great interest attached to weights in ships of this kind, and to the fact that the framing is so distinctly shown in the engraving, it may be interesting to state that the bedplate, which is of cast steel and strongly secured to bearers built into the ship, weighs thirty-six tons, and the standards and guides forty-six tons, a total of eighty-two tons. The back columns are of cast iron, while forged steel is used in the front columns, the motion bars being attached to the back columns. The engines have cylinders 40 inches, 59 inches and 88 inches in diameter respectively, all with 51 inches stroke. The high pressure cylinders are placed forward, and are fitted with piston valves, while the intermediate and low pressure slide valve are of the double flat-valve type. The reversing gear is of the ordinary link-motion type, with solid bar links and adjustable working parts. Both steam and hand reversing gears are fitted. The cylinder covers, pistons and steam chest doors are of cast steel. The piston and connecting rods are of Siemens-Martin steel, the piston rods being fitted with combination metallic packing. The crank-shafts are hollow, of forged steel, in three separate pieces, the cranks being set at 120 degrees.

The propeller shafting is hollow, of forged steel, 14¾ inches in diameter inboard and 16 inches in diameter outside the ship. The propellers are of gun metal, four-bladed, and are 17 feet in diameter by 19 feet 9 inches pitch. The surface condensers are made entirely of brass, the total cooling surface being 13,500 square feet. The circulating water is supplied by four 10-inch centrifugal pumps. Air pumps are entirely of brass, and are worked from the low pressure piston-rod crossheads; they deliver into a feed tank which overflows into the ship's fresh water reserve tanks. Evaporators, distillers, auxiliary condensers, electric light machinery, air compressing machinery and boat hoisting machinery are among the auxiliaries.



ENGINES OF ONE OF THE LARGEST WAR VESSELS AS YET CONSTRUCTED.

As this is the first large naval vessel to which Martin's system of induced draft is to be applied, results of speed trials will be watched with special interest. The principle of this draft arrangement is well known, fans being placed in the uptake, where they tend to create a partial vacuum. The boilers are eight in number, of the marine return-tube type, 16 feet 1 inch in mean diameter, and 9 feet 3 inches long, each containing four Fox corrugated furnaces 3 feet 8 inches in mean diameter. They are of Siemens-Martin steel throughout, and are designed for a working pressure of 155 pounds per square inch, and a proof pressure of 245 pounds per square inch. The heating surface is 25,248 square feet, and the grate area 855 square feet. The engraving and description of machinery are taken from Engineering of London.

Lake Freight Situation.

With few exceptions, owners of lake vessels who have sought contract ore have secured more or less of it, and the rates at which the bulk of the business has been closed up are as follows: From ports at the head of Lake Superior, 80 cents for the full season and 75 cents to Oct. 1; from Marquette, 75 cents for the full season, and 65 cents to Oct. 1; from Escanaba, 50 cents for the full season and 45 cents to Oct. 1. Contract business from Marquette and Escanaba has, of course, been light, especially at the 75-cent rate for the full season from Marquette, which was considered a desirable rate by vessel owners, but during the past week quite a little ore has been covered on contracts expiring about Oct. 1 at the rates named, 65 cents from Marquette and 45 cents from Escanaba. No charters for single trips from the head of the lakes have as yet been made, but it is thought that the wild rate will open at the contract figure, 80 cents. A few charters for first trips from Escanaba have been made at 40 cents.

Most of the ore dealers disagree with vessel owners who have advanced the opinion that the entire production of the Lake Superior region this year will be close to 10,000,000 tons. They are unwilling to admit that there is anything in the present outlook to warrant a production of more than 8,000,000 tons, which would be only a quarter of a million tons more than was produced last year. It is understood that the agreement among producers of standard Bessemer ores limits the production of these ores, according to an understanding that has not as yet been changed, to 4,500,000 tons. This does not, of course, include Mesabi ore of any kind nor any of the non-Bessemers of the old ranges. It is claimed, therefore, that as non-Bessemer ores of the old ranges are not selling as freely as they did a year ago, and as indications are not favorable to a production from the Mesabi much heavier than that of last year, the production can hardly exceed 8,000,000 tons, without a marked improvement in the demand for ore that would warrant an increase in the maximum output of standard Bessemers agreed upon some time ago. On the other hand it is certain that the ore companies control or are interested in vessel capacity that will require about 4,500,000 tons for steady employment, and arrangements have already been made to have these and other boats owned by outsiders care for nearly 7,000,000 tons of ore. If the production is to amount to only 8,000,000 tons, it would seem that little ore will be left for wild shipments, and that ore dealers have overstepped themselves in covering sales so closely by vessel contracts. But the question of this year's production is a very uncertain one, and it is not probable that the ore companies would enter as extensively into vessel contracts as they have done, if the indications were not favorable to a very much heavier output than that of 1894.

The steamers John Mitchell and M. B. Grover will each tow one of the whaleback barges this season, and four others will be assigned to boats of the Northwestern Transportation Company of Detroit and the Wilson line of Cleveland. In all cases, boats towing the barges will stay by them throughout the season, and there will be no shifting of tows from one steamer to another. This will be accomplished, of course, through the best possible arrangements for affording despatch to such tows.

The general unsettled condition of the soft coal business resulting from the strike of miners in the Pittsbutg district, and differences between operators of Ohio and Pennsylvania that seem beyond settlement leaves the lake coal trade in a deplorable condition. There is no disposition among soft coal dealers to hurry lake shipments, and a rate of 40 cents to Lake Michigan ports is the best that is talked of, with little coal for Lake Superior to be had at any price.

Hay Lake Channel Lights.

As it is expected that some time after the opening of navigation to Lake superior arrangements will be perfected for lighting Hay lake channel, vessel masters are becoming more interested in the system of lights proposed by the light-house board. In the last issue of the REVIEW there was printed a chart showing the location of lights as proposed by the joint report of the engineer and inspector in charge of the district, and now we are in receipt of a copy of the report, which follows:

To the Light House Board, Washington, D. C.: In compliance with instructions contained in board's letter of 27th July, 1894, having made a personal examination of the Hay lake channel, we the undersigned, respectfully submit the following project for lighting the channel:

For the Middle Neebish section, we recommend on the north side of the channel the establishment of three post lights, Nos. 2, 4 and 6—3,000 feet apart—to be located on a dike along the northern edge of this cut. These posts to have long arms so as to mark the edge of the cut 45 feet distant with the light. Each light to be a red Funck lantern. Opposite each of these lights on the south side of the channel, we propose a float to carry a white Funck lantern, Nos. 1, 3 and 5. The axis of the Middle Neebish cut also to be marked by range lights Nos. 7 and 9. No. 7 front range light to be a crib placed at the junction of the Middle Neebish with the lower Hay lake channel on the west side of the latter, in about 18 feet of water, bearing a post light with a white 90° lens lantern. No. 9 to be a crib placed in about 14 feet of water, bearing a post and a white lens lantern light, 90°. Opposite No. 7 a float (No. 8) bearing a red Funck lantern, to mark the edge of the channel at the turning point.

The axis of the lower Hay lake channel to be marked by a range located on the head of Neebish island (Nos. 10 and 11). To be two skeleton iron towers bearing two white lens lanterns 90°. A suitable keeper's dwelling for two keepers with necessary outbuildings to be erected at this point.

The edge of the channel of the lower Hay lake cut to be marked by two lights about midway and two at the north entrance to this cut, to be red Funck lanterns (8 day) on the east, and white Funk lanterns (8 day) on the west. (Nos. 12, 13, 14 and 15.) Of these, at No. 12 there is an old crib which can be built up at small expense on which can be erected a post. Nos. 13, 14 and 15 to be floats.

At Nine-Mile point (No. 16) we propose a crib in 12 feet of water marking turning point in middle Hay lake, to have post bearing red lens lantern, 5-day, 270°.

The entrance to the lower cut of the Little Rapids section to be marked by a crib light located on the east side of the entrance (No. 17) in 18 or 20 feet of water, to be white lens lantern, 90°, 5-day, and form with No. 18 a range to guide through upper Hay lake from Nine-Mile point. No. 18, a skeleton iron tower on foundation or small crib in 2 or 3 feet of water, being rear range to No. 17, white lens lantern, 90°, 5-day.

At Six-Mile point, range lights (Nos. 19 and 20) to guide through upper cut of Little Rapids section. Iron towers, white lens lantern, 90°, keeper's dwelling, etc.

On Frechettes point, range lights (Nos. 21 and 22) to guide through lower cut of Little Rapids section, iron towers, white lens lanterns, 180°.

Two post lights to light about midway the upper Little Rapids section where the cut through island No. 1 commences, (Nos. 23 and 24) one red and one white Funck lantern.

At the north end of cut where the channel again enters the St. Mary's river proper, one crib light (No. 25) is proposed on the west side in 20 feet of water, the crib surmounted by keeper's dwelling carrying fourth order lantern with fifth order flashing light.

RECAPITULATION.

Nos. 1, 3, 5—Three lighted floats, south side of Middle Nebish cut, white Funck lanterns.
Nos. 2, 4, 6—Three post lights on dike, north side of cut. Red Funck lanterns.
No. 7—Crib light at northwest entrance to cut, forming front range with No. 9. White lens lantern 90°.
No. 8—Float on east side, opposite No. 7, with red Funck lantern.
No. 9—Crib in 14 feet of water, with white lens lantern, 90°, forming rear light to No. 7.
Nos. 10 and 11—Range on head of Neebish island to guide through lower Hay lake; skeleton iron towers; white lens lantern, 90°; double keeper's dwelling.
No. 12—Crib on east side of lower Hay lake cut. Red Funck lantern 8-day
No. 13—Float on west side; white Funck lantern, 8-day.
Nos. 14 and 15—Floats at north entrance to lower Hay lake cut, east side red, west side white. Funck lanterns, 8-day.
No. 16—Crib light near Nine-Mile point, 5-day white lens lantern, 270°.
No. 17—Crib light on east side entrance to lower cut of Little Rapids section, forming front range with No. 18 to guide through upper Hay lake, 5-day white lens lantern, 90°.
No. 18—Skeleton tower, with 5-day white lens lantern, 90°, rear to No. 17.
Nos. 19 and 20—Six-Mile point range. Two skeleton iron towers; white lens lanterns 90°; guide through Little Rapids section, upper cut. Keeper's dwelling.
Nos. 21 and 22—Range on Frechettes point. Two iron towers; white lens lanterns, 180°; guide through lower cut of Little Rapids section.
Nos. 23 and 24—Post lights, one red Funck lantern, east side, and one white Funck lantern, west side on island, about midway Little Rapids section.
No. 25—Crib west side of north entrance to cut, keeper's dwelling, fourth order lantern; flashing white light, 5th order.

Respectfully,
W. W MEAD, Com. U. S. N.,
Inspector 11th L. H. District.
M. B. ADAMS, Maj. of Eng's, U. S. A.,
Engineer 11th L. H. District.

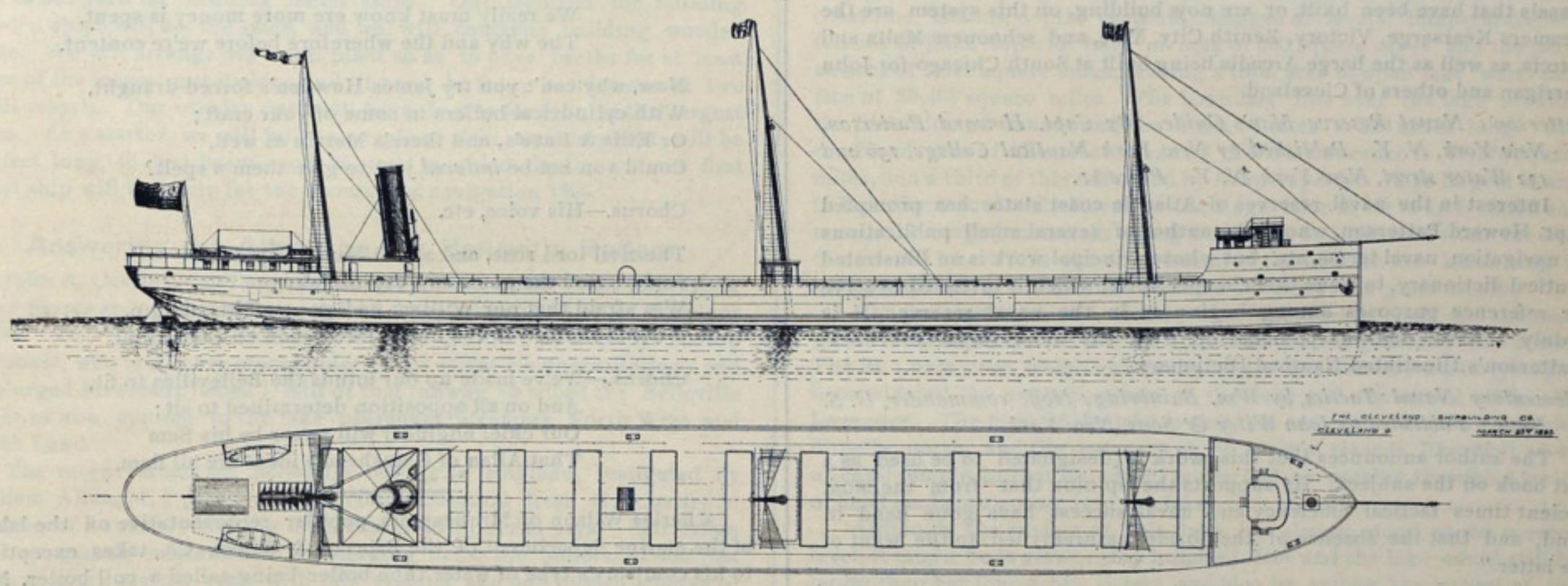
In accordance with the list of bids printed elsewhere in this issue, Geo. Warrington of Chicago has been awarded the contract for the composite light-vessel that is to be constructed by the light-house board for service in Boston harbor.

One of the 400-Foot Lake Freighters.

One of the several 400-foot steamers now building in the ship yards of West Bay City, South Chicago and Cleveland for general freighting business on the lakes is illustrated on this page. The engraving was made from plans of the steamer Yale, which is now well under way at the yard of the Cleveland Ship Building Company. This boat is not, strictly speaking a 400-foot boat, but she will come within the new class, as her dimensions are 396 feet over all, 375 feet between perpendiculars, 45 feet moulded beam and 28 feet moulded depth. Alike to the two steamers of about the same dimensions building in South Chicago, her bottom will be built on the channel system of construction, introduced by Sinclair Stuart, surveyor for the United States Standard classification society of New York, which is the corporation classifying these boats. This system of construction has attracted a great deal of attention, as it is a special feature in these big boats. General Manager James Wallace of the Cleveland company says that repairs to water bottoms will not be more expensive on account of this adoption, and he commends it on the claim that it permits of much deeper fret lock plates, deeper centre keelson braces, deeper side girder plates and better fastenings for all of these parts. In this ship all side girder plates are intercostaled to the shell plating, and the construction throughout will embrace the best methods that have of late been adopted to secure strength in the lake freight ships.

The water bottom is 4½ feet deep and is divided according to the usual method of securing separate water-tight compartments. The spar deck is of steel and the main deck wood, and there are, in addition to two trimming hatches aft, eleven working hatches, spaced 24-foot centers, with five gangways on each side of the ship. As shown by the plans, the arrangement of houses on deck forward and aft, which is the same as that generally adopted for lake freight steamers, permits of an open deck for the rapid handling of cargo through the long row of big hatches. Each hatch will be supplied with a double drum, operated by line shaft, which is attached to one of the ship building company's regular pattern of cargo hoisting engine, which is of 15 inches bore and 12 inches stroke. A single shutter, handled by a device similar to that used on the Nicholas and other boats built by this company will be used to cover gangway openings.

The engines of this boat, as well as those of the two steamers building at South Chicago, are to be of the type now in use in the steamer Kearsarge. The Cleveland company is building all three sets. They are triple expansion having cylinders 23, 38 and 62 inches in diameter with a common stroke of 40 inches. Steam at 170 pounds pressure will be supplied by two boilers, each 14 feet diameter and 13 feet long, with three 46-inch furnaces. The boat's equipment will, of course, include a steam steerer and steam windlass and capstans. The steerer will be of the Williamson make.



STEEL SCREW LAKE FREIGHT STEAMER YALE—396 FEET OVER ALL.

Work of the Ship Yards—Three Steamers Launched.

At three ship yards in as many lake cities launches occurred on Saturday last. All three were freight vessels, two of them being modern steel steamers. There was the usual ceremony and a great gathering of people in each case, although launches on the lakes occur almost weekly in the spring and early part of the summer season.

The largest of the three vessels launched Saturday was the steel steamer J. J. McWilliams, built by F. W. Wheeler & Co. of West Bay City, for John Mitchell and others interested in boats that are managed in the office of Mitchell & Co., Cleveland. This steamer is 352 feet keel, 42 feet beam and 27 feet deep and is in all respects representative of the best type of freight vessels to be found on the lakes. Mr. Wheeler is credited by everybody for whom he has built boats with doing more than is really required of him, in order to satisfy customers and turn out good ships, and in this vessel the disposition of the West Bay City firm is especially noticeable. The McWilliams has triple expansion engines, which were also built by Wheeler & Co. She will be ready to go into commission in a few weeks. Work on the two steel lumber carriers, which are to have a capacity of about 2,000,000 feet each, and for which Mr. Wheeler secured contracts recently, will be begun at once.

The second large freight boat launched Saturday was the steel screw steamer Chili, which is being built by the Cleveland Ship Building Company for Capt. M. M. Drake of Buffalo and which will be employed in the lake line of the Lackawanna company. This steamer is in all respects a duplicate of the I. W. Nicholas, built last winter at the same yard for the Minch line of Cleveland, and which has proven one of the most successful boats for general freighting on the lakes. The Chili is 342 feet over all, 42 feet beam and 27 feet depth. Her spar deck is of steel and main deck of wood. There are ten hatches, 8 feet wide and 29 feet long, spaced 24-foot centers, and four cargo gangways on each side. The water bottom is 4½ feet deep and is divided into eight compartments. Other details of construction may be found in the REVIEW of August 9, 1894, in which issue the duplicate ship, I. W. Nicholas, is very fully described. Engines are of the triple expansion type, with cylinders 20, 33 and 54 inches diameter and a common stroke of 40 inches. Two Scotch boilers, each 12 feet 4 inches in diameter and 13 feet long, will furnish steam at 170 pounds pressure. The propeller is sectional, four-bladed, 13 feet in diameter and 15 feet pitch. A photo-chromotype of the I. W. Nicholas appears as a supplement to this issue. Its publication is timely, as the picture is in all respects a likeness of the Chili as well as the Nicholas.

A single-decked, wooden steamer, the Argo, which is intended exclusively for the lumber trade, was launched at the Orleans street yard of the Detroit Dry Dock Company, about the time at which the two steel boats just described were being dropped into the water in West Bay City and Cleveland. This is the boat being built by the dry dock company for C. R. Jones, the Fisher-Wilson Company of Cleveland and others. This boat is a very trim looking craft and will rank among the best lumber carriers on the lakes. She will be ready to go into commission in two weeks, and this season will tow two lumber schooners for A. G. Comstock of Detroit, formerly of Alpena. She will herself carry 750,000 to 800,000 feet of lumber on 12 feet draft, and it is expected that she will tow the two schooners, loaded, at the rate of 7½ to 8 miles an hour. The Argo is 185 feet keel, 35½ feet beam and 15 feet deep. She will be driven by a compound engine having cylinders 22 and 42 inches diameter, with 36 inches stroke, the steam for which will be furnished by a cylindrical steel boiler 12 feet 3 inches by 11 feet long, which is fitted with the Howden system of forced draft.

Of the several wooden vessels building at the yard of Capt. James Davidson, West Bay City, only one, a schooner of large capacity, is as yet ready for launching. She will be floated this week. She will be named Granada.

Capt. Alex. McDougall of the American Steel Barge Company expresses a hope that arrangements will be made so that his company will be enabled to soon begin the construction of two new boats at West Superior.

Before purchasing your tickets, first ascertain the rate via the Nickel Plate road. 224 Apl30

Books and Other Publications.

United States Standard Register of Shipping—1895-96. Published by the United States Standard Steamship Owners' Builders' and Underwriters' Association, Limited, of New York.

This is the classification register known among builders, and steel makers in this country as the "red book." This years' issue of it is the most elaborate ever published. As the New York society publishing the Standard Register has, through its surveyor, Sinclair Stuart, classed, under special survey for insurance purposes, probably 75 per cent. of the steel vessels built on the lakes during the past three or four years, each issue of the book is more interesting and of more importance to lake interests than its predecessor. The constant increase in the number of new steel vessels on the lakes has opened up to this society a greater field for its work than is to be found on the entire sea coast of the country, and the managers of the organization have been more successful than either of the two other classification societies that have sought a part of the business. As a result, this latest issue of the Standard register shows marked improvement over previous issues, and the society is now engaged on a supplement containing matters of a special kind regarding the construction of hulls for the lake trade. The book contains, in addition to the revised classified list of vessels, all rules thus far prepared for the construction of iron, steel and composite vessels, as well as the special rules issued some time ago for the building and classification of wooden vessels for lake service.

This issue of the register contains rules covering the new channel system of construction, which has excited so much attention on the lakes, and numerous plates are given illustrating its peculiarities. Among lake vessels that have been built, or are now building, on this system are the steamers Kearsarge, Victory, Zenith City, Yale, and schooners Malta and Marcia, as well as the barge Arcadia being built at South Chicago for John Corrigan and others of Cleveland.

Patterson's Naval Reserve Man's Guide.—By Capt. Howard Patterson, New York, N. Y. Published by New York Nautical College, 130 and 132 Water street, New York, N. Y. Price $1.

Interest in the naval reserves of Atlantic coast states has prompted Capt. Howard Patterson, who is the author of several small publications on navigation, naval terms, etc., but whose principal work is an illustrated nautical dictionary, to issue this cheaper book, which is intended to serve for reference purposes among beginners in the naval reserve. It is mainly a naval dictionary, made up from the more important work, "Patterson's Illustrated Nautical Dictionary."

Elementary Naval Tactics, by Wm. Bainbridge-Hoff, commander, U. S. Navy. Published by John Wiley & Sons, New York.

The author announces that this work is designated to be used as a text book on the subject. He supports the opinion that "from the most ancient times tactical efficiency and naval success have gone hand in hand, and that the absence of the former assuredly led to the want of the latter."

Joseph R. Oldham of Cleveland has issued a revised number of a book which he had published some time ago containing the general dimensions, as well as particulars of boilers and machinery, of steel vessels on the lakes. The book also contains certain rules for the construction of vessels, tables of scantlings, etc , and to this second issue there has been added some standard data relative to the chemical properties and proper treatment of mild steel, strength and weight of materials transposition of knots into statute miles and other memoranda that has suggested itself as interesting to ship owners and ship builders.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store and afloat at the principal points of accumulation on the lakes on April 20, 1895:

	Wheat, bushels.		Corn, bushels.	
	In store.	Afloat.	In store.	Afloat.
Chicago	22,802,000	1,812,000	4,496,000	1,678,000
Duluth	12,529,000	85,000	.....	.....
Milwaukee	621,000	.....	.....	.....
Detroit	932,000	617,000	164,000	.....
Toledo	1,429,000	278,000	746,000	.....
Buffalo	1,860,000	.....	162,000	.....
Total	40,173,000	2,792,000	5,568,000	1,678,000

Bothered with Nothing Less than Millions.

Ferdinand Schlesinger of Chapin mine fame is a curious mixture. Like Colonel Sellers or Monte Cristo, he bothered his head with nothing less than millions. An illustration of his carelessness in small matters at the zenith of his success is furnished by a story in connection with the Deutcher club of Milwaukee of which he was a member. When the club was fitting up rooms in the old opera house block a purse to cover the expense was made up by some of the wealthier members subscribing $50 each. When the collector of the club called on Schlesinger for his subscription the big mine owner turned to his clerk and said, "Make out check for $1,000 for the Deutcher club."

"But, Mr. Schlesinger," gasped the collector.

"Well, what's the matter? Isn't that enough?"

"More than enough. If you wish to be so generous I have no doubt the club will be delighted, but your subscription was only $50."

"Is that so?" laughed Schlesinger. "I had forgotten." And tearing up the first check, he ordered another made out for the amount of his subscription.

When the story leaked out the collector was roundly rated by the members, who argued that if he had kept the check it would have been worth a case of wine. Probably the wine came anyway, but the incident showed Schlesinger's carelessness in what he considered small matters. In spite of the trouble he caused there are not a few Milwaukeeans who have yet a soft side for the daring speculator.—Milwaukee Correspondence.

Battle of the Boilers.

(*From Fairplay, London.*)

In the house of commons bold William held forth
On the water tube boilers for all he was worth;
Said he, "Do you mean to fit more of such trash?
If you do, you will find there will soon be a smash."

Chorus.—His voice it was loud, and his language was strong;
We have suffered this nonsense a great deal too long;
We really must know ere more money is spent,
The why and the wherefore before we're content.

Now, why can't you try James Howden's forced draught,
With cylindrical boilers in some of your craft;
Or Ellis & Eave's, and there's Martin as well,
Could you not be *induced* just to give them a spell?

Chorus.—His voice, etc.

The civil lord rose, and at William he spoke,
And treated the game as a capital joke;
Was afraid that our William had gone off his chump,
When he talked to the house like a man on the stump.

Chorus.—We've made up our minds the Bellevilles to fit,
And on all opposition determined to sit;
Our chief engineer will swear by his Sam
That Allan of Gateshead's ideas are all flam.

Charles Wilson of Minneapolis, popular representative on the lakes of the marine department of the Babcock & Wilcox Co., takes exception to his company's type of water tube boiler being called a coil boiler. Mr. Wilson's objection is well founded, as he directs attention to the fact that every square inch of the surface of the Babcock and Wilcox boiler, inside and out, is accessible for cleaning and actual inspection. "This can not be truthfully said" he adds "of coil boilers or boilers made up of plumbers' fittings. We use neither bent tubes nor coils, only all straight tubes."

Three big steel vessels, which are about ready for lake freight service, were registered last week in the office of the bureau of navigation, treasury department. The whaleback John B. Trevor, hailing from Buffalo, is numbered 77,173, and her tonnage is 1730.00 gross and 1,318.39 net. The Minnesota Steamship Company's tow barges Marcia and Marguerite, hailing from Cleveland, are numbered 92,638 and 92,636 respectively, and the tonnage is the same in both cases, 2,237.48 tons gross and 2,132.40 net.

Capt. John Prindeville of Chicago has asked the REVIEW to aid in a search for Roy Brown, a lad of fifteen years who left a good home in Chicago six weeks ago and who is supposed to be on some lake steamer. Capt. Prindeville says the boy's mother is greatly distressed on account of his absence. He has dark brown hair and eyes and fair complexion, and when he left home he wore a blue chinchilli overcoat, Stanley cap, dark Scotch mixed coat and vest, blue-black cheviot pants and lace shoes. The boy's father is L. C. Brown of 727 Stock Exchange building, Chicago.

Cleveland's city council has accepted the bid of W. E. Rooney of Toledo to do harbor dredging for five years at 12 cents per cubic yard and to furnish tugs for logging at $8 an hour

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LISTS OF MASTERS AND ENGINEERS OF LAKE VESSELS, TOGETHER WITH NAMES AND ADDRESSES OF MORE THAN A HUNDRED FIRMS AND CORPORATIONS CONTROLLING LINES OF FREICHT AND PASSENGER STEAMERS ON THE LAKES, MAY BE HAD IN PAMPHLET FORM FROM THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, FOR 25 CENTS.

Schedule of the Bids for Light Vessel.

Following is a schedule of bids opened at the office of the light-house board, Washington, D. C., on the 11th inst., for the construction of a first-class composite light-vessel:

Name and Address of each Bidder.	Amount of Bid.
George Warrington, Chicago, Ill.	$ 64,500
The Atlantic Works, East Boston, Mass.	77,800
Wm. E. Woodall & Co., Baltimore, Md.	80,000
John H. Dialogue, Camden, N. J.	82,000
The Pusey & Jones Company, Wilmington, Del.	86,000
Thomas S. Marvel and John Delaney, Executor, Newburg, N. Y.	91,000
C. Reeder & Sons, Baltimore, Md.	92,850
The Chicago Ship Building Company, Chicago, Ill.	115,000

It will be noted that there were only two bidders from the lakes, George Warrington and the Chicago Ship Building Company, both of Chicago. The bid of George Warrington was the lowest by more than $13,000.

Capt. Davidson's Plans.

In a letter to the REVIEW, Capt. James Davidson thus outlines his plans for beginning the business of building steel vessels:

"We will do nothing about arranging our steel ship building plant here until we are through with our present rush of work. We have been as busy this winter with our wooden plant as we have ever been since we began building ships. We expect to get all the work we now have on hand off the stocks and away from here by July next, and then we will arrange part of our yard for building metal ships. Our facilities for building wooden ships will be the same, and we will continue building wooden boats. We will arrange our steel plant so as to have berths for at least three of the largest metal ships and if need be four, besides one or two small vessels. Our wooden yard will have berths for four of the largest ships. As a starter, we will build a couple of steel steamers that will be 350 feet long, 43 feet beam, and 26 feet moulded depth, and our first metal ship will be ready for the opening of navigation 1896."

Answering the Attack on the Belleville Boilers.

John A. Currier, chief engineer of the Boston steam yacht Wild Duck, never passes an opportunity to defend the Belleville type of tubulous boiler. The Wild Duck is owned by Mr. Forbes, a wealthy Boston merchant, who is a heavy stockholder in the Great Northern Railway and who urged President James J. Hill of that railway to adopt the Belleville boiler as now applied to the lake passenger steamers North West and North Land.

The recent attack on Belleville boilers in England, instigated by William Allan, M. P., brings out a communication from Mr. Currier in Fairplay of London. Writing from Boston Mr. Currier says: "Mr. Allan has been grossly misinformed concerning Belleville boilers. I am just beginning my eighth year with this system, and am now in charge of 425 horse power of these boilers in a steamer. Only recently I read a letter from Mr. J. J. Hill, president of the Great Northern system of railways and steamships, to one of the large stockholders of the company, speaking in the highest terms of the Belleville boilers in the lake steamer North West, and as the boilers are being fitted to a second boat of the line Mr. Allan must be mistaken as regards these boats. The letter was written to John M. Forbes, owner of the vessel I am now chief engineer of, and it was owing to his recommendation that the boilers were placed in the North West. His conclusion was arrived at by personal observation on three steamers owned by him for several years, and all fitted with the same system of boilers. This same line owns six steamers fitted with the Scotch boilers, so that there is a grand opportunity to make comparisons. The fusible plugs Mr. Allan speaks of are made of lead, and are about $\frac{5}{32}$ of an inch diameter at the larger end, and taper to nearly a point at the small end; they are driven by an instrument constructed for that purpose into the end of tube elements, and can be driven under any pressure without stopping the fires. The object of the plug is to give warning if the water should get low in the boilers by melting out, allowing the steam to blow. The boilers of the North West were the first built in this country, and the holes were left smooth instead of taping a partial thread as the design called for, but the trouble was discovered before the steamer made the regular trial trips. After the change was made they had no further trouble with plugs. In regard to salt water I have used it freely, and find the circulation so great that it cannot stick to the tubes or injure them in any way, as it all passes to the receptacle provided for that purpose, and is thence blown out. It is situated in a cool place and cannot be burned on. I have run for days round the coast of Florida, and the West India and Bahama islands, where the percentage of salt is much greater than in the Atlantic ocean, and I have never had occasion to repair my boilers, nor had any trouble of foaming, and under all circumstances the boilers gave perfectly dry steam, as I have proved by the reading of the calorimeter. The reducing pressure valve has never given any trouble by sticking; the great care bestowed on the construction and details makes that almost an impossibility. There has been strong opposition to water-tube boilers in this country, but as the boilers have run so many years now, the opposition is dwindling down to a few old fossils, who believe in the old fashioned single-cylinder low-pressure engine. It seems human nature to kick against any innovation. The shell boilers will soon be a thing of the past. We must carry high pressures, and use steam for a great number of expansions to get the greatest economy, and must look to water tube boilers to accomplish this end. I can remember how hard it was to introduce propellers and do away with side wheels for ocean steamships. Some years ago the Hon. John M. Forbes built a large twin screw ocean tow boat; all the engineers condemned her, and, although she worked successfully, it was a number of years before she came to be used to any extent, wholly owing to 'kickers.' I believe the time will come when the gentlemen who introduced the Belleville boilers into the British navy will be spoken of as eminent, far-seeing engineers, and engineers far in advance of their times."

Facts About Lake Superior.

Lake Superior is the largest body of fresh water on earth. Probably the next largest body of fresh water in the world is Victoria Nyanza in equatorial Africa, which has an estimated area of 25,000 to 30,000 square miles, as against Lake Superior's known surface of 32,166 square miles. Mark W. Harrington, chief of the United States weather bureau, has of late made a study of physical features of Lake Superior. He spent the greater part of last summer on the north shore of the lake, and is now engaged in collecting a vast amount of information relative to its area, coast line, islands, depth, currents, changes of levels, temperature, etc. Islands of Lake Superior have an area of 660 square miles and the bays an area of 1,041 square miles, leaving a total area of open lake water surface of 30,465 square miles. The boundary line over the lake between the Dominion of Canada and the United States is 200 miles long. The combined area of the great lakes of the St. Lawrence is 95,275 square miles, and a third of this is formed by Lake Superior. The largest island in Lake Superior is Isle Royal, or the Regal island. It is an isolated and nearly submerged mountain rising from 1,000 to 1,500 feet from the bottom of the lake. It is the only island of the kind in the lakes, and is only paralleled by isolated and volcanic islands of the great oceans.

The drainage basin of Lake Superior is relatively small, and the margin of the watershed is low in all directions, and is generally ill-defined. The St. Louis river, which enters the lake at the extreme westerly angle, is considered the mother stream of the lake and the source of the St. Lawrence. The form of the lake is that of a crescent, with the convexity directly north, and the entrance at St. Mary's river is like that of an oriental temple, in that its center is reached by passing through a series of head lands projecting into the lake.

Although the surface of this lake has always stood at its present level, it might be lowered many hundred feet and the lake would still be larger than her four great sisters, and also be among the largest of the bodies of fresh water on the earth's surface. If the water sank to the level of the ocean the lake would still be between one-third and one-half of her present size, with outlines practically the same. Otter Head would still exist and Isle Royal would tower 1,000 feet or more above the water's surface. The deepest point in the lake is about half way between Otter Head and Keweenaw point, and on a line between the eastern end of Isle Royal to Caribou island. The soundings here are scanty, but the basin with depths of more than 150 fathoms or 900 feet, appears to be an oval area twenty-five miles long by ten miles broad. This is 300 feet below sea level. The greatest depth in the lake is 10,008 feet. Thus after drainage, the lake would not only be large, but deep as well.

The water of the lake is remarkable for its extreme purity, very little being added and very little being taken away, but the temperature is so low that a human being exposed to it does not long survive. Drowned bodies sink to the bottom and are rarely recovered. Snow falls near the center of the lake every month in the year, even in midsummer. The temperature is low in winter and moderate in summer. As low as 75 degrees below zero has been registered in winter on the north shore. The climate in the vicinity is essentially northern, as is shown by the temperature of the land and by the vegetation. The soil is scanty but very rich.

TWO BOOKS OF SAILING DIRECTIONS, ONE COVERING LAKE SUPERIOR AND THE ST. MARY'S RIVER AND THE OTHER COVERING LAKE MICHIGAN AND THE STRAITS OF MACKINAC, ARE NOW OFFERED FOR SALE BY THE HYDROGRAPHIC OFFICE. THESE BOOKS ARE PARTS OF A WORK THAT WILL COVER THE ENTIRE CHAIN OF LAKES. THEY CONTAIN CHARTS OF LEADING CHANNELS AND HARBORS, AND MAY BE HAD FROM THE MARINE REVIEW, 516 PERRY PAYNE BUILDING. CLEVELAND, AT $1 EACH.

The Nickel Plate road can offer to the Sons of the American Revolution reduced rates to their convention at Boston, Mass., April 30th. Remember we operate through sleeping cars direct to Boston. 223 Apl30

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,341 vessels, of 1,227,400.72 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons and over that amount on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1894, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,731	843,239.65
Sailing vessels	1,139	302,985.31
Canal boats	386	41,961.25
Barges	85	39,214.51
Total	3,341	1,227,400.72

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
Year ending June 30, 1890	218	108,515.00
" " " 1891	204	111,856.45
" " " 1892	169	45,168.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
Total	872	406,976.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			SuezCanal.		
	1894.	1893.	1892.	1894.	1893.	1892.
No. vessel pass'ges	14,491	12,008	12,580	3,352	3,341	3,559
T'n'ge, net registd	13,110,366	9,849,754	10,647,203	8,039,105	7,659,068	7,712,028
Days of Navigat'n	234	219	223	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

CAPT. M. M. DRAKE of Buffalo is to be especially commended for the earnest stand he has taken on the question of purchasing fuel in Buffalo from hard coal shippers. His relations with the Lackawanna company offer loop-holes through which the vessels which he controls individually might be used to break the agreement, with apparent excuse for their purchasing fuel through the Lackawanna company, but they were not so used when an opportunity presented itself a few days ago. Coal shippers who are claiming that the arrival of the grain fleet at Buffalo will result in a collapse of the fuel agreement, may yet find that there is honor among the men who have signed their names to a contract that is simply intended to overcome a bad abuse in their business. President Livingstone and the officers of the Lake Carriers' Association in Buffalo and Cleveland are certainly making a strong effort to succeed in the fue matter.

CLEVELAND, as well as Chicago and Detroit, is now moving toward the establishment of a naval militia. The navy department has no ships to loan for training purposes, but other equipment may be secured from the department upon any of the state organizations making written application for the same through the governor of the state, and in accordance with regulations that will be explained by the secretary of the navy. Chicago was fortunate in securing the brick battleship Illinois for naval reserve purposes, after the close of the World's Columbian Exposition. The Chicago organization has also received from the navy department twelve boats, including a steam launch, sailing launch, cutters, etc., and all their equipments, one one-pounder rapid fire Hotchkiss cannon, cutlasses, etc.

LEADING engineering publications of England manifest great interest in the proposed tests, by the bureau of engineering, navy department, of the two big freight steamers being built by the Chicago Ship Building Company, and which are duplicates in every respect, excepting that one is to be fitted with Scotch boilers and the other with Babcock and Wilcox tubulous boilers. It is to be hoped that the tests to be made on these boats will not be confined to a run of a few hours or even a day. In order to be of commercial value these tests should at least extend over a full trip, and if possible important data should be collected for a number of trips, in order to bring out the merits or defects of the two types of boilers for long runs and under various conditions.

IN answer to an inquiry from the Upson, Walton Co. of Cleveland relative to size of bells to be used aboard all vessels, in accordance with provisions of the new White law, Supervising Inspector Galwey says that the inspectors will pass bells if they are 16 inches in diameter at the mouth and not less than 10 inches high, made of bell metal and weighing 75 pounds.

Death's Door Passage.

In their efforts to collect and distribute all kinds of information that may in any way interest lake vessel masters, the officers of the hydrographic service have sought reports from light keepers regarding shoals, currents, etc. Information thus secured is not new in all cases but it is quite accurate and may often serve to prevent stranding. One of the latest hydrographic publications contains a letter from the keepers of the Porte des Morts light-station, Lake Michigan, who says:

"Masters of vessels are warned against the currents which run in and out through this entrance, particularly on the south sides of Pilot and Plum islands. With southerly winds the current sets about N.N.W., passing on both sides of Pilot island, a branch passing to the N. W. and south of Plum island. Its strength depends in a great measure on the velocity of the wind. Vessels standing in from the eastward should keep the lighthouse bearing between N.N.W. and north as they approach it and should stand well over to the 9-foot shoal before changing course to pass up the channel. With the wind N.W. and blowing the strong current sets out into the lake and is frequently so strong that the sailing vessels can not make headway against it. Sometimes the current is against the wind. The passage to the northward of Pilot and Plum islands is preferable to the one to the southward, as the north shores of the islands can be approached quite close-to, and there is but one shoal, nearly in mid-channel, which can easily be avoided. The most dangerous shoal in this vicinity is that projecting to the southwestward from Pilot island. Over this shoal the current runs with great strength and vessels from the eastward are frequently carried on the shoal. This may be avoided by watching the bearing of the light-house when standing in. If the bearing is not changed to the northward, it is evident that the vessel is being carried to the northward, consequently the course should be changed well to the southward of west, and not again to the northwestward until the light-house bears north. Off the S.E. and N.W. sides of Plum island are shoals, but the north and S.W. sides can be approached quite close-to. North of Plum island is a shoal of cobble stones, called Middle shoal with a depth of 10 feet over it. Near the S.E. end of this shoal is the wreck of the schooner H. M. Scove, with a least depth of 6 feet over her. The wreck lies across the reef for a length of 80 feet and forms a very dangerous obstruction to navigation."

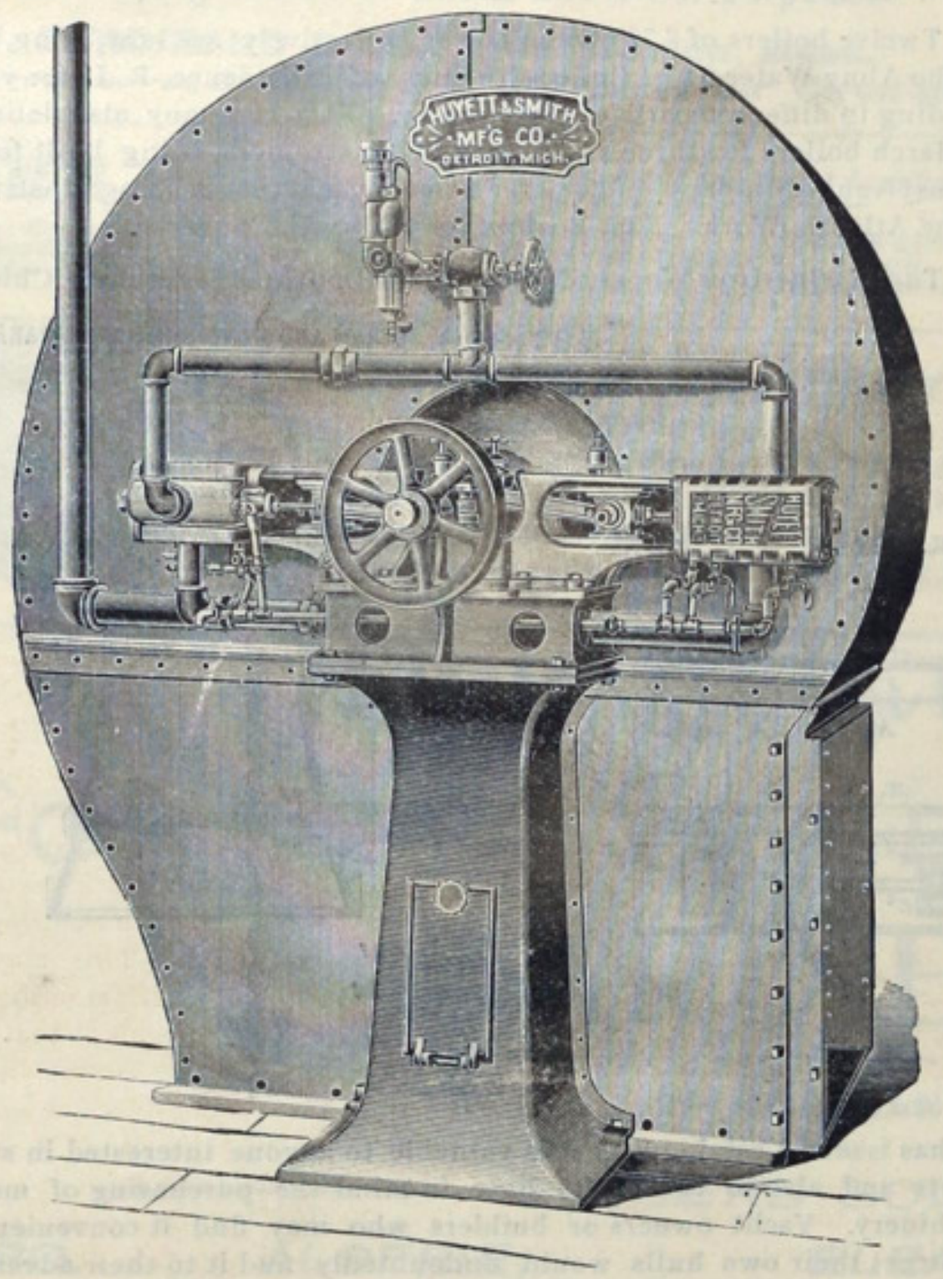
Figuring on a Guarantee of 20-Mile Speed.

The Detroit Dry Dock Company has been awarded the contract for the side-wheel steamer to be built for the Cleveland & Buffalo Transit Co. Not all of the details have as yet been decided upon, and on this account the REVIEW refrains from entering into a lengthy description of the boat, but as an indication of the high class of steamer it is intended to build, it may be noted that one question unsettled is that of allowing the dry dock company a premium of 5 per cent. over the contract price, which will be about $342,000, for a guarantee of 20 miles speed. The boat, according to plans upon which the contract is based, will be 308 to 310 feet over all, 76 feet over guards, and 17 feet deep. This length is about 14 feet greater than that of the big steamer City of Detroit of the D. & C. line, and the boat will have 25 to 30 per cent. more power than that steamer, with the addition of forced draft and other modern appliances intended to increase the speed. The depth may be changed somewhat, as plans for larger engines than those first thought of are being considered, and this would necessitate greater depth and larger paddle boxes.

Lewis Nixon, formerly chief constructor at Cramp's and now proprietor of the Crescent Ship Building Company of Elizabeth, N. J., delivered last week the first of a series of lectures on "Modern Shipbuilding," at Cornell University, Ithaca, N. Y. In the course of his address Mr. Nixon urged very strongly that such an important and growing profession as ship building should be fully recognized and opportunities provided for the young men of the United States so that they need not go to Europe to receive an education as naval architects. "Almost every 'ism' is fostered in New York," he said, "and yet the great colleges of that city contain no chair of naval architecture." The United States, he averred, was destined to become the great ship building country of the world, owing to its extensive ocean and lake coast, and for that reason the art of naval architecture, which is one of the most difficult professions in the world should be given the widest encouragement in this country.

Smith Steel Plate Steam Fan.

The accompanying engraving illustrates the Smith steel plate steam fan, with attached double horizontal high speed engine. This fan is designed especially for forced draught under boilers, both marine and stationary, and for ventilation purposes generally. The shell is made of heavy sheet steel, securely bolted to a heavy angle iron frame. The shaft is made of the best steel, and is of large diameter running in self-oiling adjustable journal boxes, lined with the best anti-friction metal and provided with oilers so arranged that they may be filled while the fan is running; water



lined boxes being provided where gases at very high temperature are handled. The blades of the fan wheel are constructed of heavy sheet steel and firmly riveted to wrought iron arms or spiders cast solid in the hub.

The engine is the Smith double horizontal high speed balanced valve engine, constructed upon the center-line principle, thereby adding greatly to the strength and rigidity of the frame. The cylinders are placed opposite each other and nearly on a line. The cranks are double, located exactly opposite each other. By this arrangement the pistons, cross-heads, connecting rods and all other moving parts of each side exactly counter balance the other side; in other words, the reciprocating parts of this engine move to and from each other at eactly the same time, and as they are alike in weight, each part counterbalances its duplicate on the other side of the engine. A perfect balance is a very desirable feature in an engine, as it overcomes vibration, lessens friction, wear and tear and liability to derangements of parts. The engine is supported by a heavy cast iron pedestal.

These fans are built with and without engines and arranged to discharge in any direction. They are made regularly as exhaust fans with the inlet on the opposite side from the engine, so as to avoid drawing the air across the engine, but where it is necessary to do so they are built as blowers with inlets on each side. Further particulars regarding the apparatus, together with printed matter and prices may be had from the makers, the Huyett & Smith Mfg. Co., Detroit, Mich., well-known manufacturers of ventilating fans, blowers, exhaust fans, hot blast dry kilns, hot blast heating apparatus, marine water tube boilers, engines, etc. A copy of this company's general catalogue will be forwarded to anyone interested in these mechanisms for the asking.

William Wilson, brother of Capt. Thomas Wilson, died at his home in Cleveland, Wednesday. Alike to other members of the Wilson family, who were among the early settlers at Sault Ste. Marie, William Wilson was well known around the lakes. He was a man of modest disposition, amiable, and of high Christian character. He had been engaged in assisting Capt. Wilson in the management of vessels of the Wilson line in Cleveland for about 15 years past.

Around the Lakes.

The Postal Telegraph Company will keep its Sault office open both day and night during the season of navigation. Messengers will also be stationed on the canal for the accommodation of marine men.

Capt. Geo. Warner, has been appointed harbormaster in Cleveland. He is deserving of the office and the appointment meets with general approval, although the vessel interests have always commended the services of the retiring harbormaster, Peter Lynch. It is simply a case of politics.

Among new local inspectors of steam vessels on the lakes are Capt. James Hogan in the Chicago district and Henry Bloecker at Grand Haven. Capt. Hogan, who will look after Chicago hulls, formerly sailed the steamer Albert Soper. Mr. Bloecker is to be boiler inspector at Grand Haven. He is one of the best known citizens of that place and for a long time past has been engaged in the construction of steamboat machinery.

Vessel masters of Cleveland, before adjourning for the summer their usual weekly meetings, sent resolutions to Washington commending the service of Major W. B. Stockman, the local representative of the weather bureau. Major Stockman gave up during the winter a great deal of time that might be claimed as his own in directing the attention of the vessel masters to the work of the government bureau of which he is an officer.

Capt. William B. Scott, who died in Cleveland a few days ago, was best known to lake men as an insurance agent. Previous to 1893, he conducted for a number of years a prosperous business in hull and cargo insurance. He was a man of integrity and was generally well thought of among vessel owners. He had sailed lake vessels when a young man and was also interested in vessel property. The death of his son, W. C. Scott, occurred four weeks ago in Georgia, and was very sudden, resulting from being thrown out of a buggy.

Joseph Berolzheim, general freight and passenger agent of the Lake Michigan & Lake Superior Transportation Company, informs the REVIEW that the report of a special traffic arrangement between the Big Four railway company and his company for business through Benton Harbor, Mich., can refer to nothing more than a business that was carried on at that point all of last season. "We have a traffic arrangement with the Big Four" he says "to take south bound, as well as north bound business, via Benton Harbor, and we expect to have our steamers call at Benton Harbor every trip this season, if business warrants.

Miscellaneous Mention.

Work has been commenced on the dock within the east arm of the Cleveland breakwater, which is to be constructed by the Pennsylvania Company for the accommodation of the fuel business of the Cuddy-Mullen Coal Company.

The World Specialty Company of Detroit reports heavy sales of its new injector, known as the international high-grade automatic. Claims made for this injector are that it handles a much hotter water supply than other automatic injectors and that it works under very high steam pressure.

It is a long time since a new vessel of any kind has been turned out from Owen Sound, Ont., but a wooden side-wheel steamer, built by Capt. John Simpson, was launched there a few days ago. She was named City of Toronto and will be owned by the North Shore Navigation Company. Her principal dimensions are 162 feet over all and 38 feet beam over guards. She will run on the Owen Sound-Parry Sound route.

About May 4, the fixed red lantern light, exhibited from the end of the elavated conduit, near the outer end of the south pier, Grand Haven harbor, will be discontinued, and on the same date the structure from which this light is exhibited will be moved 511 feet along the south pier, to a point about 75 feet from its outer end, and the light reestablished therein without any other change. Thereafter the name of the light will be Grand Haven pierhead light.

Stone's metallic piston and valve rod packing, manufactured by Stone & Hannah, 83 Putnam street, Cleveland, O., is gaining favor among engineers. It is in use on about 25 steam vessels on the lakes, among the more important of which is the Passadena, M. B. Grover, C. Tower, Jr., Geo. F. Williams, Pioneer, City of Cleveland, Colonial, Phillip Minch, Volunteer and the Saugatuck. As a proof that it is giving satisfaction, additional orders are being received for the same steamers and also from other steamers of the same fleets.

Owners of the wrecking steamer Favorite have expended considerable money in preparing her for service at the straits, where she is again stationed this winter. She has a search light of 850 candle power, six cluster lights, each of fifty candle power, to be used in and around wrecks, and a powerful light to be used beneath the water in the examination of damaged stern bearings or screw. Throughout the tug, in the best locations, incandescent lights have been scattered. She will carry two derricks for hoisting cargo, and will have new arches each further strengthened by steel plates running their entire length.

Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

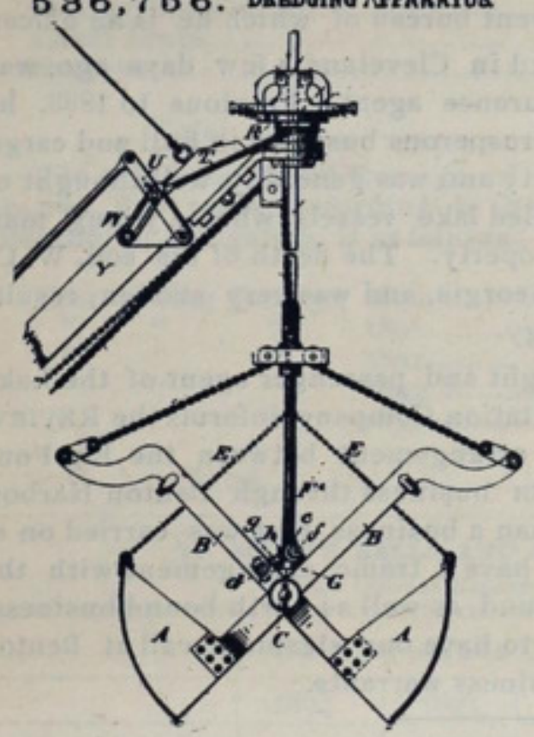
536,756. **Dredging Apparatus.** Caspar Meier, San Francisco, Cal. Filed March 16, 1894. Serial No. 503,882.

Claim—In a dredging machine, the combination of the buckets shaped in the form of sectors of a cylinder, their peripheries being concentric with the axes on which they swing, a guiding stem or spar attached by a swivel bearing to the axes of said buckets, a locking device for preventing longitudinal movement of the stem while the buckets are being filled, a rotary releasing cam for disengaging said locking device, and a connection between the stem and the buckets for producing partial rotation of the stem as the buckets close.

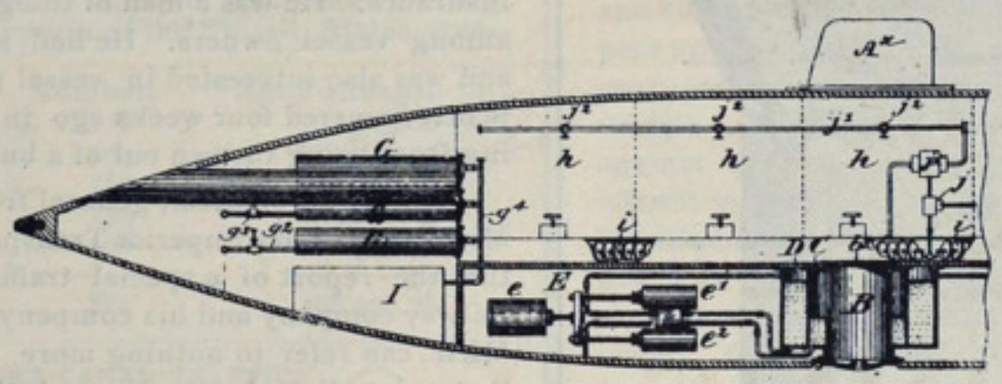
537,113 **Submergible Boat.** John P. Holland, Newark, N. J. Filed June 15, 1893. Serial No 477,661.

Claim—A submergible vessel or boat having a receptacle for liquid fuel, a receptacle for water adjacent to the fuel receptacle and a pump comprising a pump cylinder and pipes for pumping out the liquid fuel to be expended and a pump cylinder and pipes for pumping water from outside the vessel into the water receptacle, the capacity of displacement of said pump cylinders being proportioned to the difference in specific gravity between the liquid fuel and water.

536,756. DREDGING APPARATUS.



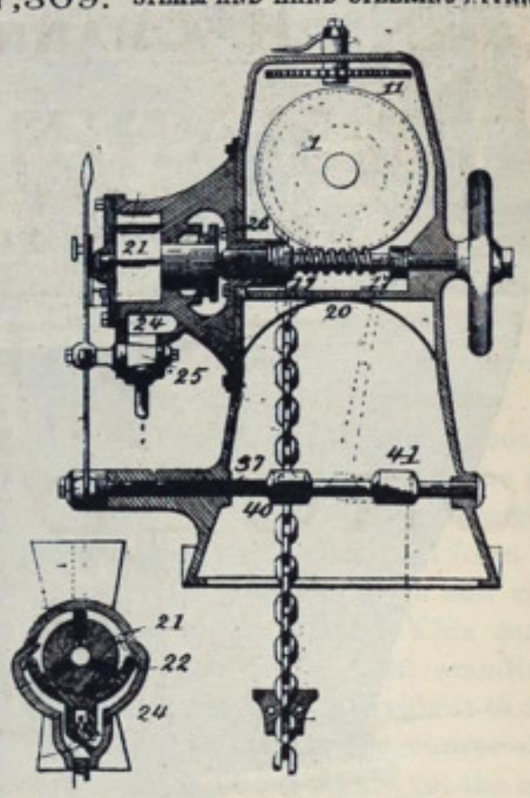
537,113. SUBMERGIBLE BOAT.



537,309. **Steam and Hand Steering Apparatus.** Hale G. Robinson, Port Huron, Mich. Filed Jan. 8, 1894. Serial No. 496,092.

Claim—In a steering apparatus, the windlass and connections to the rudder, the worm shaft gearing with the worm wheel of the windlass, said shaft having a polygonal end entering the hub of the rotary steam actuated piston, said piston being mounted on the casing which supports the windlass, all combined.

537,309. STEAM AND HAND STEERING APPARATUS



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PARSONS & PATTISON CHEMICAL CO.,

1509 Masonic Temple, CHICAGO, ILL.

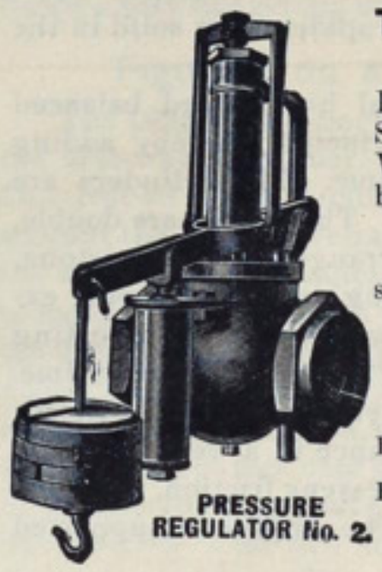
Trade Notes.

Crawley & Johnston of Cincinnati, O., have contracted to put one of their automotic steam steerers on the steamer H. F. Frisbee, which is owned by the Huntington & St. Louis Tow Boat Company of Cincinnati.

A very attractive catalogue, containing illustrations of the most noted cup-defenders, has been issued by the H. Channon Company, Chicago, to call attention to paints which they have manufactured according to formulas made up by them after years of experience with what is required in this line for marine use. Write them, mentioning the REVIEW, and get a copy of the catalogue.

Twelve boilers of 3,720 horse power collectively are now being built by the Almy Water Tube Boiler Company of Providence, R. I., for yachts building in different parts of the country. This company also delivered in March boilers for three small passenger steamers, being built for the Pennsylvania Company, and one for a steam yacht that is being constructed at the Atlantic Works, East Boston, for Henry E. Converse.

The Marine Iron Works, Clybourn and Southport avenues, Chicago, Ill., has issued a catalogue that is valuable to anyone interested in steam yachts and also to those who have in mind the purchasing of marine machinery. Yacht owners or builders who may find it convenient to construct their own hulls would undoubtedly find it to their advantage to write this firm for information and estimates regarding machinery.



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Is the simplest and best for reducing the pressure to Steam Steering Engines, Donkey Engines, Steam Winches and all places requiring a uniform pressure below that of boilers.

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P. M. Church, Sault Ste. Marie. Jas. Walker & Son, Detroit.
Jas. Clements & Son, Bay City, Mich
Cleveland Ship Building Co., Cleveland.
Chicago Ship Building Co., Chicago.

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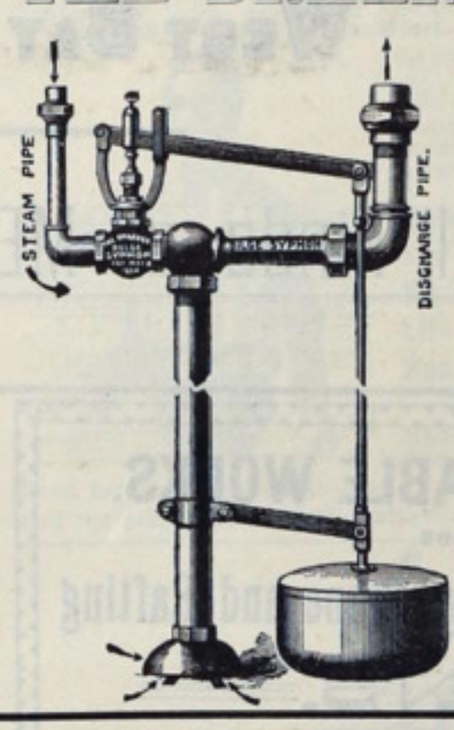

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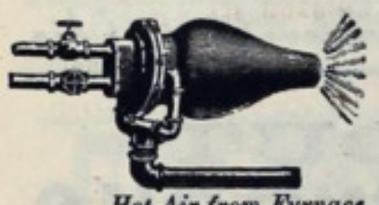

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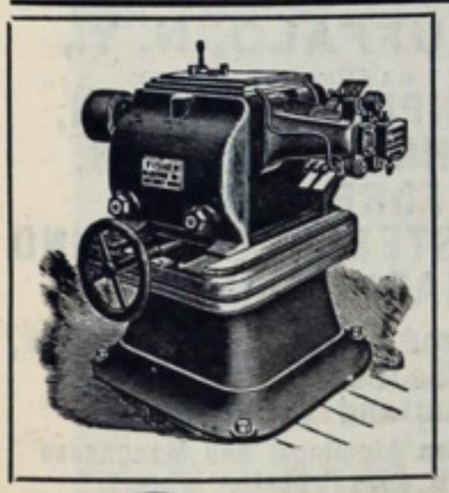

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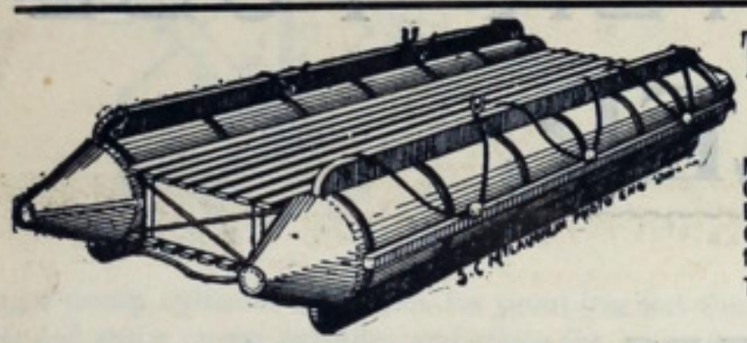

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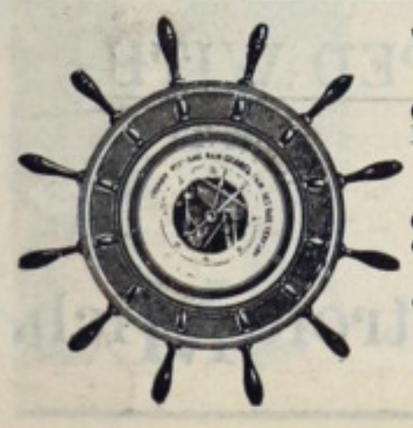

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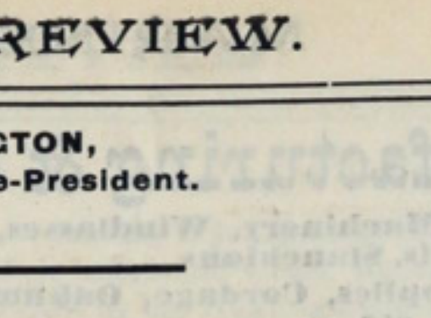

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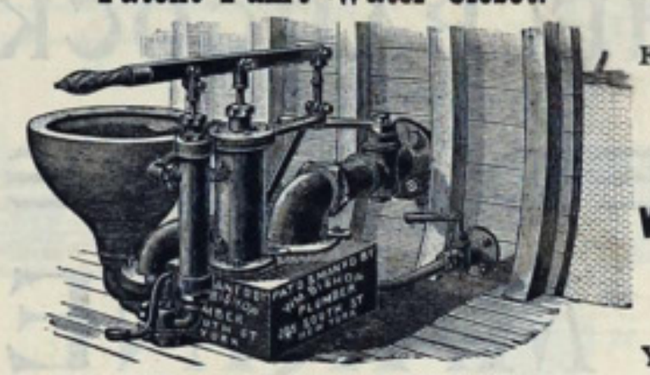

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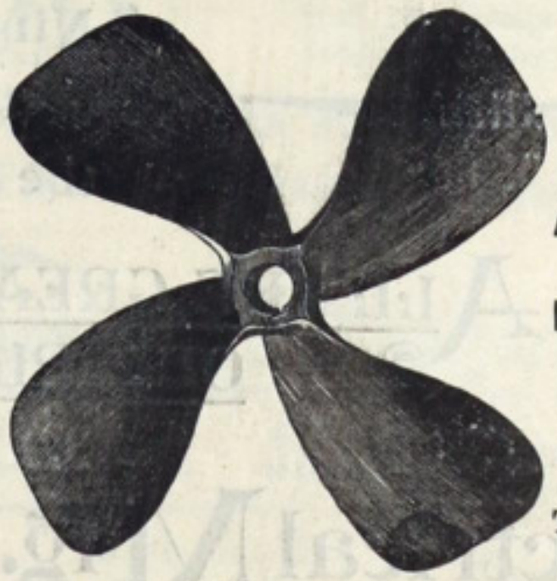

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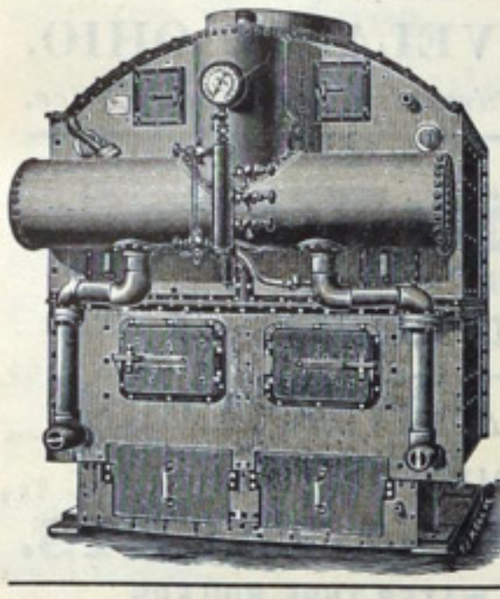

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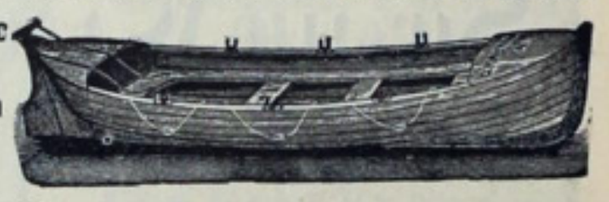

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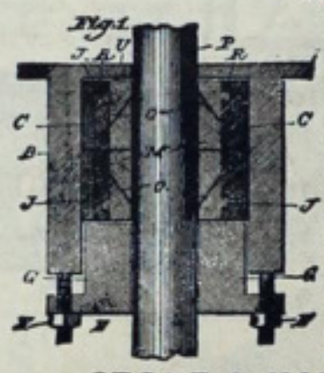

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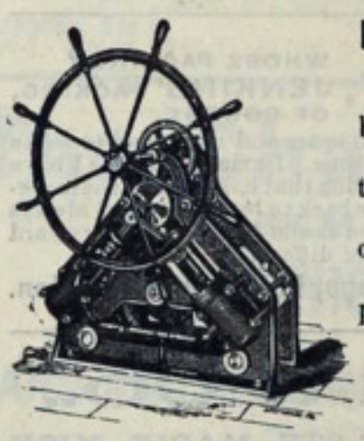

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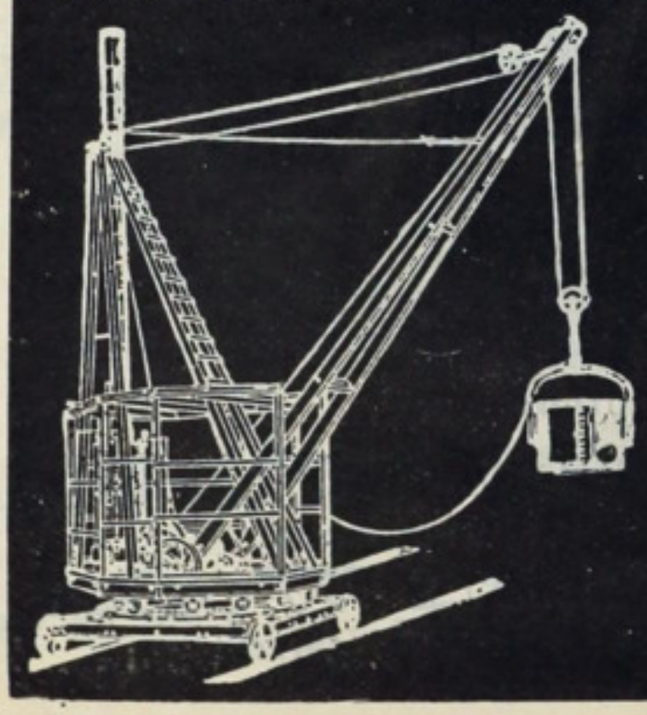

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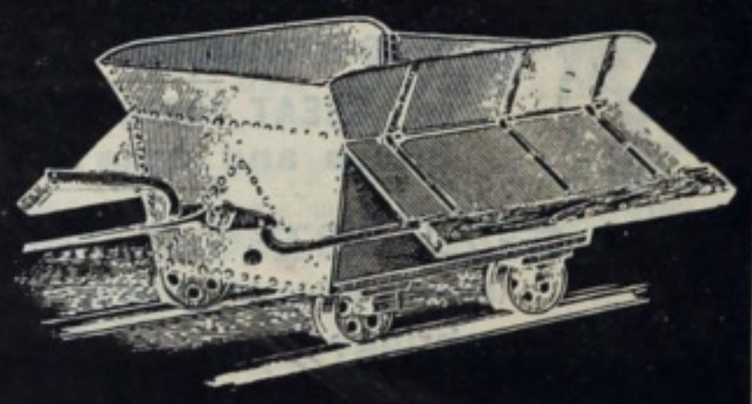

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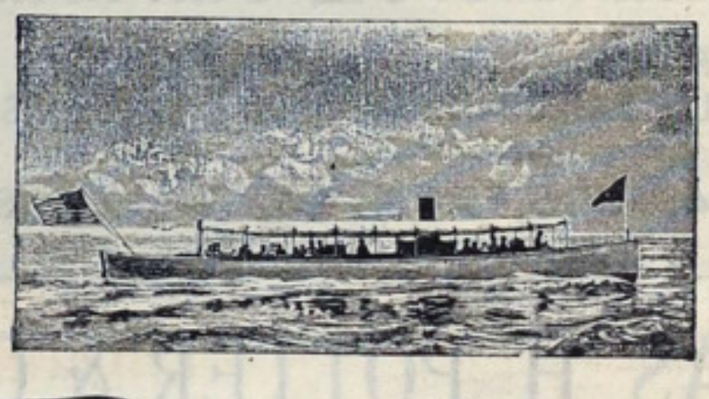

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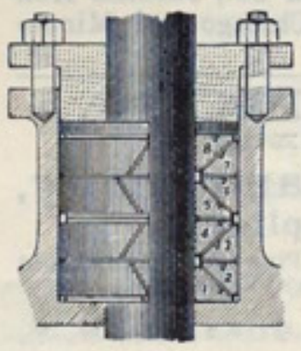

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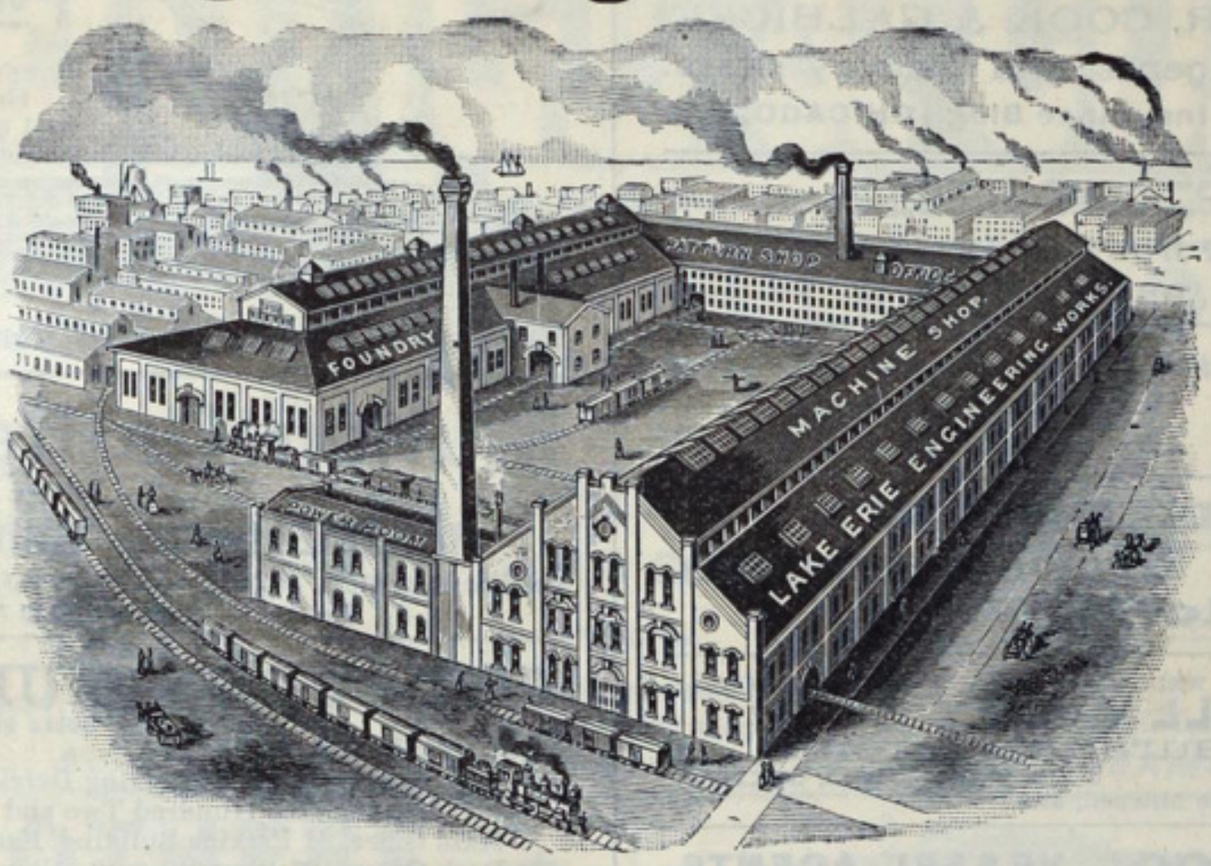

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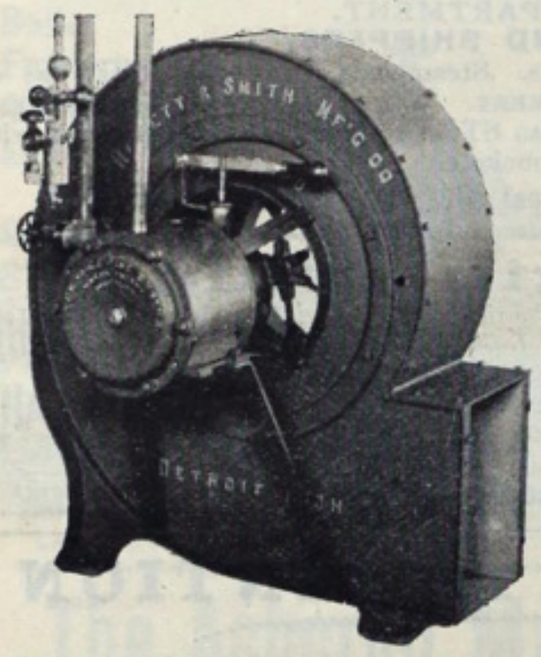

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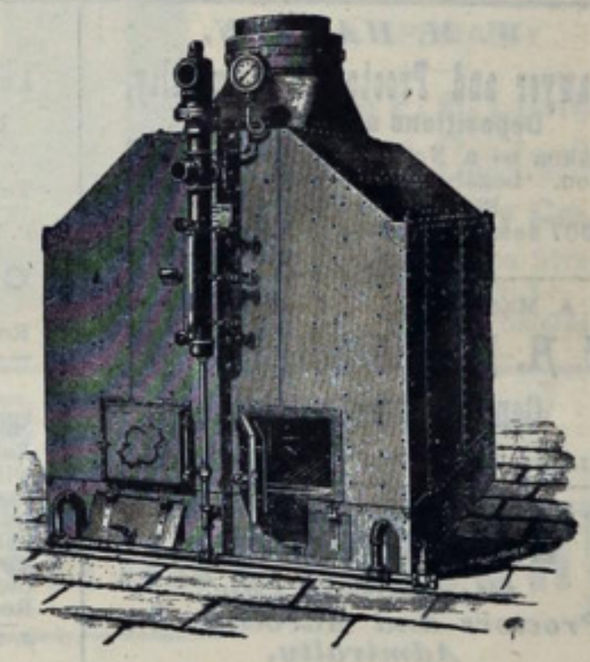

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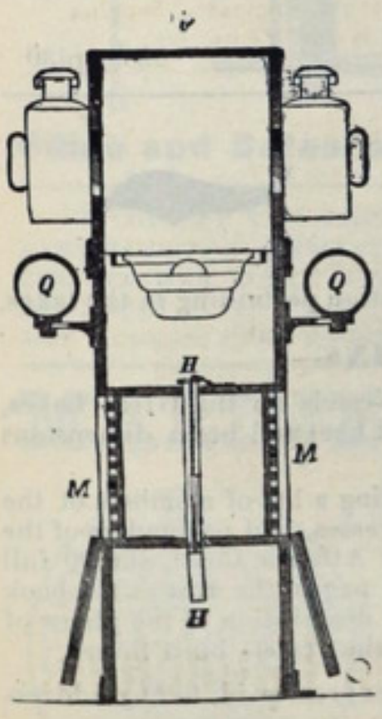

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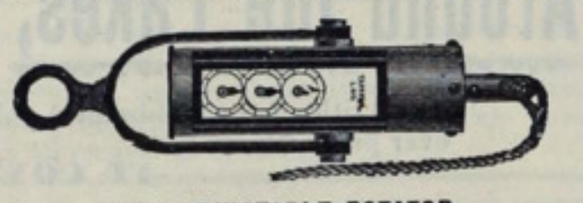

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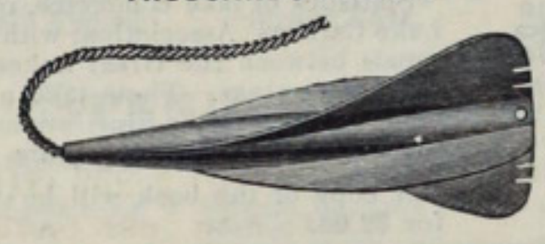

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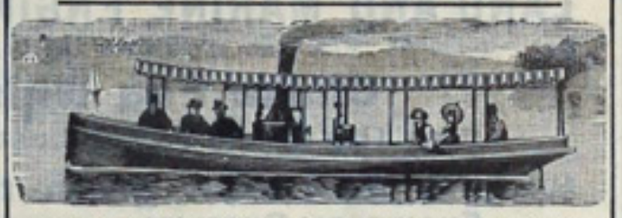

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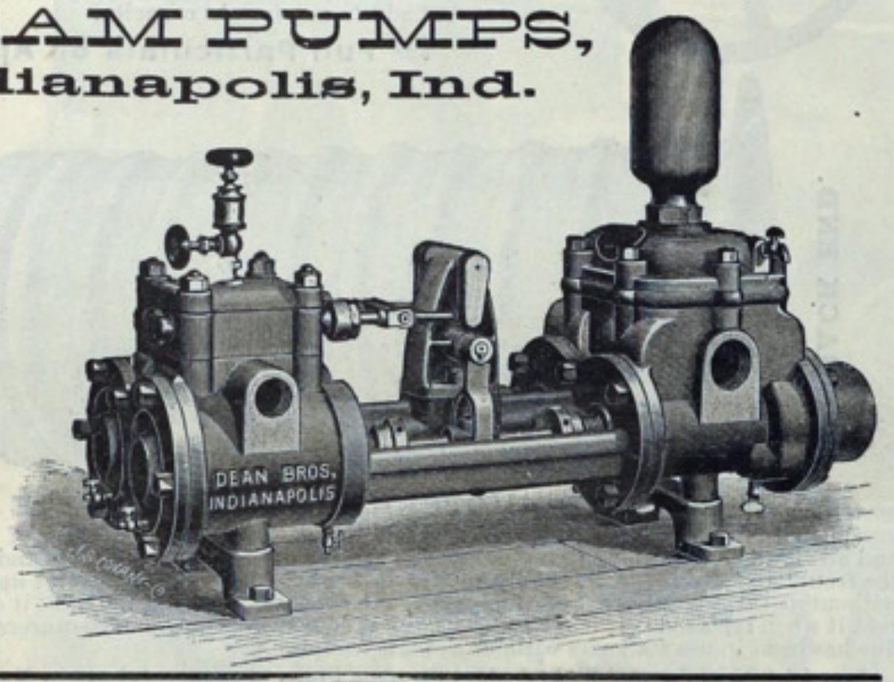

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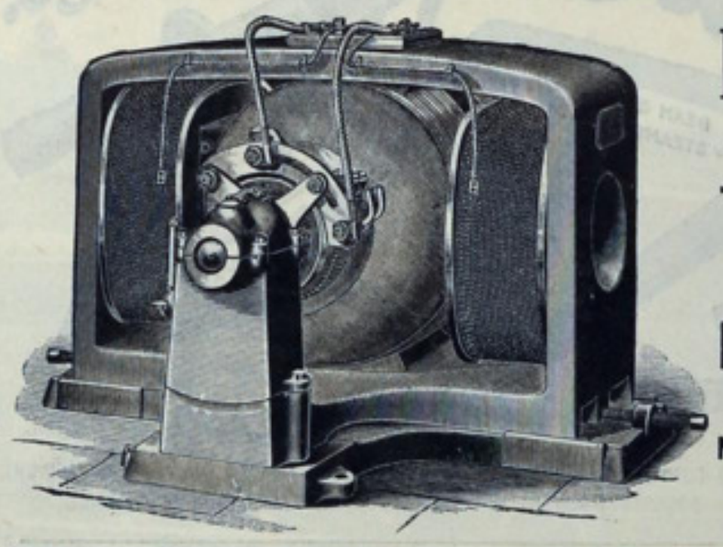

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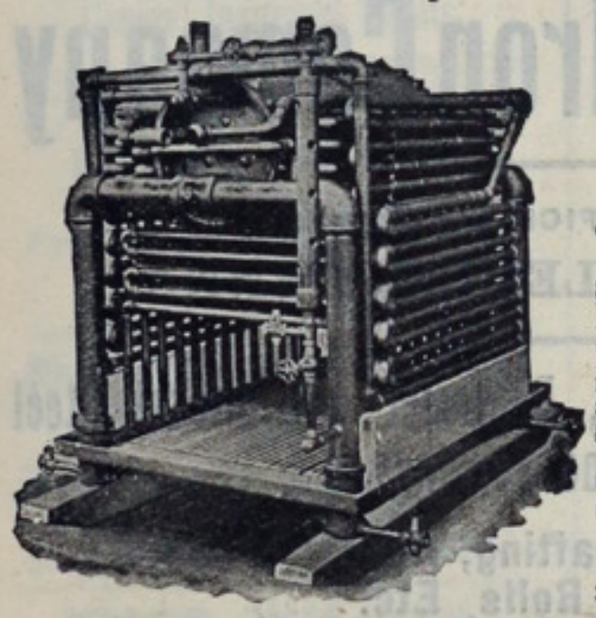

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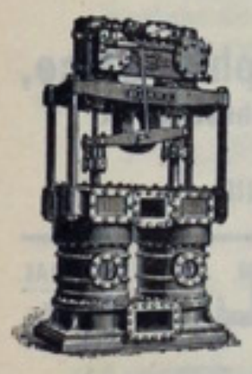

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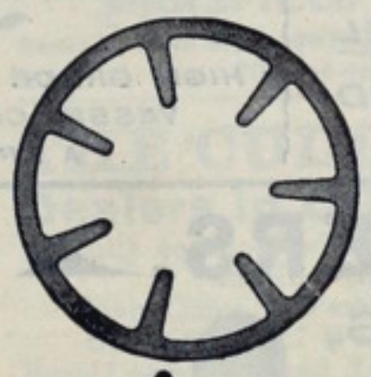

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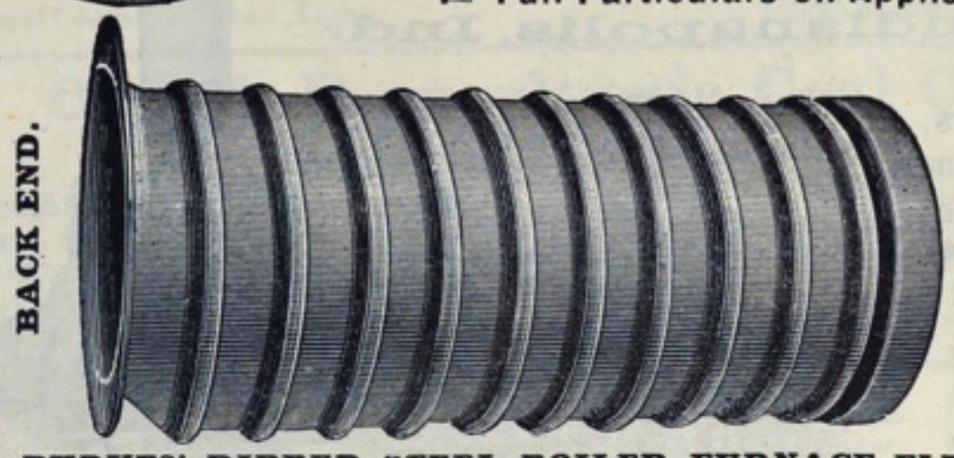

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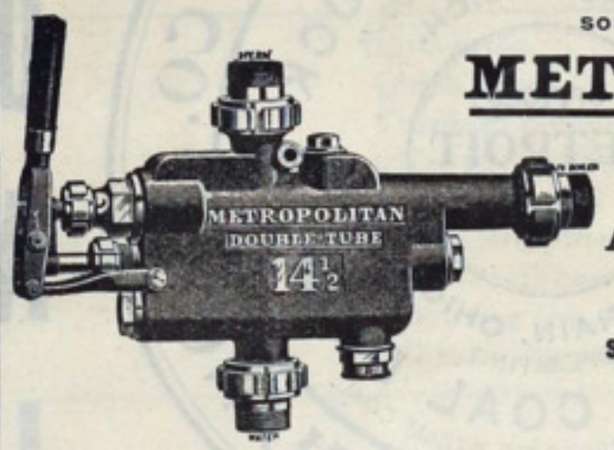

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